

**Answers to EXAMPLE 1. HYPOTHETICAL – NEW PC-BOILER (1304 MMBTU/HR)**

TOOLS:

Emissions Factors (EF) based on proposed permit limits:

Pollutant	Emissions Factor (lb/MMSCF NG)*
PM	Limited to 0.15 gr/dscf
SO <sub>2</sub>	0.11
NO <sub>x</sub>	0.09
VOC	0.0034
CO	0.15
Greenhouse Gases	
CO <sub>2</sub>	213.4 lb/MMBtu
CH <sub>4</sub>	0.04 lb/ton
N <sub>2</sub> O	0.64 lb/ton

**PROBLEM SOLVING:**

**Question 1: What would the emissions be for the proposed project?**

Example Calculation:

PM<sub>10</sub> Emissions [tons/yr] =

(90 MMBtu/hr) \* (1 MMSCF/1020 MMBtu) \* (7.6 lb/MMSCF) \* (8760 hr/yr) \* 1 ton/2000 lb = **2.93 tons/yr**

CO<sub>2</sub> Emissions [tons/yr] =

(1304 MMBtu/hr) \* (213.4 lb/MMBtu) \* (8760 hrs/yr) \* (0.0005 ton/lb) = 1218838

**Calculations**

Calculated Total Emissions from the PC-Boiler (Tons/Year):								
PM/PM <sub>2.5</sub> /PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO		CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
<b>139.95</b>	<b>628.40</b>	<b>514.13</b>	<b>19.54</b>	<b>856.908</b>		<b>1,218,838</b>	<b>131.13</b>	<b>26.26</b>

**Question 2: On a mass basis, what are the total emissions of GHGs?**

CO<sub>2</sub>+CH<sub>4</sub>+N<sub>2</sub>O = Total Emissions of GHG's (on a mass basis, tpy)

**= 1,218,878 tons/year**

### Question 3: What are the total emissions of CO<sub>2e</sub>?

Step 1: Refer to Global Warming Potential (GWP) Table (Title 40, Part 98, Subpart A, Table A-1)

Step 2: Identify pollutants and their respective GWPs.

Pollutant	Global Warming Potential
CO <sub>2</sub>	1
CH <sub>4</sub>	21
N <sub>2</sub> O	310

$$CO_{2e}(tpy) = \sum (GWP_i \times MassEmissionRate_i(tpy))$$

$$CO_{2e}(tpy) \text{ Example} = (\text{mass } CO_2 * 1) + (\text{mass } CH_4 * 21) + (\text{mass } N_2O * 310) =$$

**1,227,254.65 tons/yr**

Calculations [tons/yr] =

Question 4: So, we have

GHGs(mass)	CO <sub>2e</sub>
1,218,878	1,227,255

### **APPLICABILITY ANALYSIS:**

**Question 1:** Does this facility require a Title V permit “anyway” (e.g. regulated pollutants  $\geq$  100 tpy)?

**YES**

**Question 2:** Does the permit action have GHG emissions in excess of thresholds?

>100 tpy mass GHG (Title V)	<b>Yes</b>	No _____
>100/250 tpy mass GHG (PSD)	<b>Yes</b>	No _____
>75,000 CO <sub>2e</sub>	<b>Yes</b>	No _____
>100,000 CO <sub>2e</sub>	<b>Yes</b>	No _____

**Question 3:** Does the permit action require a PSD “anyway” ?

>100 tpy listed major source (ARM 17.8.801)	<b>Yes</b>	No _____
>250 tpy non-listed major source	Yes _____	No _____

What are the facility's permit requirements?

**Title V Operating Permit**

**Permit decision occurs before 1/2/2011** – GHG's do not need to be considered. The facility would be required to include applicable requirements for criteria pollutants only (nothing has changed).

**Step 1: Permit decision occurs between 1/1/2011 and 7/1/2011** – the facility would be required to submit an application for a Title V Operating Permit and must include applicable requirements for both criteria pollutants and GHG. The Department would address GHG in the Technical Review Document attached to the Operating permit. If the facility is subject to PSD (as in this example) then the facility would also need to include any BACT requirements from the PSD process and associated conditions.

Keep in mind—the new facility must submit an application for a Title V Operating Permit by 7/1/2011 or one year after commencing operation—whichever is later (ARM 17.8.1205).

**Step 2: Permit decision after 7/1/2011**

Facility GHG mass emissions are  $\geq 100$  tpy, and the CO<sub>2</sub>e emissions are  $\geq 100,000$  tpy. Therefore, the facility would be required to submit an application for a Title V Operating Permit and must include applicable requirements for both criteria pollutants and GHG. At this time, there are not applicable requirements for GHGs so the facility would simply need to acknowledge GHGs. The Department would then address GHGs in the Technical Review Document attached to the Operating permit. If the facility is subject to PSD (as in this example) then the facility would also need to include any BACT requirements from the PSD process and associated conditions.

**PSD**

**Permit Decision before 1/2/2011:** This facility would be considered a listed source because the boiler capacity is greater than 250 MMBtu/hr (pursuant to ARM 17.8.801). The emissions are  $\geq 100$  tpy for CO, NO<sub>x</sub>, PM, and Sox; therefore the facility would be subject to PSD for those pollutants. No other requirements for GHGs would apply under PSD.

**Step 1: Permit decision occurs between 1/1/2011 and 7/1/2011:** Again, this facility would be considered a listed source because the boiler capacity is greater than 250 MMBtu/hr (pursuant to ARM 17.8.801). The emissions are  $\geq 100$  tpy for CO, NO<sub>x</sub>, PM, and Sox; therefore, the facility would be subject to PSD for those pollutants. In addition, the facility's GHG mass emissions are  $\geq 0$  tpy, and the CO<sub>2</sub>e emissions are  $\geq 75,000$  tpy; therefore, the facility would be also be subject to PSD for GHGs. The permit requirements for PSD application remain the same. The only difference would be that the facility would also need to address GHGs in the BACT analysis.

**Step 2: Permit decision after 7/1/2011**

Again, this facility would be considered a listed source because the boiler capacity is greater than 250 MMBtu/hr (pursuant to ARM 17.8.801). The emissions are greater than 100 tpy for CO, NO<sub>x</sub>, PM, and Sox; therefore, the facility would be subject to PSD for those pollutants. In addition, the facility's GHG mass emissions are  $\geq 100$  tpy (threshold for listed source), and the CO<sub>2</sub>e emissions are  $\geq 100,000$  tpy (considered major for GHG); therefore, the facility would be also be subject to PSD for GHGs. The permit requirements for PSD application remain the same. The only difference would be that the facility would also need to address GHGs in the BACT analysis.